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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/580,696	05/25/2006	Winfried Esser	2003P10441WOUS	5436
22116 7590 12/29/2011				
SIEMENS CORPORATION				
INTELLECTUAL PROPERTY DEPARTMENT				
170 WOOD AVENUE SOUTH				
ISELIN, NJ 08830				
EXAMINER				
WONGWIAN, PHUTTHIWAT				
ART UNIT		PAPER NUMBER		
3741				
MAIL DATE		DELIVERY MODE		
12/29/2011		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary**Application No.**

10/580,696

Applicant(s)

ESSER, WINFRIED

Examiner

PHUTTHIWAT WONGWAN

Art Unit

3741

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 October 2011.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on ____; the restriction requirement and election have been incorporated into this action.
- 4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 5) ☒ Claim(s) 19, 21-23, 26-33, 36 and 38-42 is/are pending in the application.
- 5a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 6) ☐ Claim(s) ____ is/are allowed.
- 7) ☒ Claim(s) 19, 21-23, 26-33, 36 and 38-42 is/are rejected.
- 8) ☐ Claim(s) ____ is/are objected to.
- 9) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 10) ☐ The specification is objected to by the Examiner.
- 11) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 12) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/06)
Paper No(s)/Mail Date ____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date ____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: ____

DETAILED ACTION

Response to Amendment

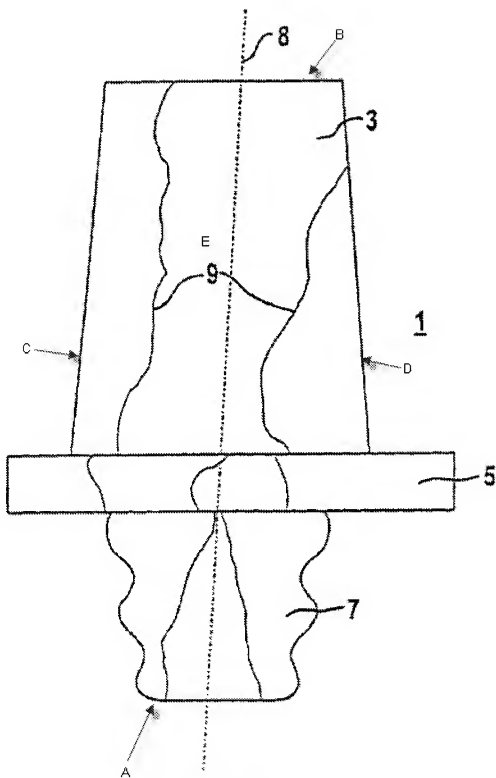
1. This office action is responsive to the amendment filed on 10/24/2011. Claims 1-18, 20, 24-25, 34-35, 37 and 43-44 have been canceled and accordingly, claims 19, 21-23, 26-33 and 38-42 are currently pending in this application.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claim 19, 21-23, 26-33, 39 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Burgel (US Patent No. 7,005,015) in view of Bicicchi (GB 1,534,399) or Clark (US Patent No. 4,962,586) or Bodnar (US Patent No. 5,108,699) or Boyle (US Patent No. 3,139,337) or Darolia (US Patent No. 5,116,438) or Tanaka (US Patent No. 4,404,049).



4. As to claim 19, Burgel discloses a high temperature gas turbine component the made from a nickel based superalloy (col. 2, line 21, "a nickel-base superalloy"), the component comprising: a root section A (fig. 1 above); a platform section 5 (fig. 1) arranged adjacent to the root section A (fig. 1 above); a tip section B (fig. 1 above) arranged radially opposite the root section A (fig. 1 above); a leading edge C (fig. 1 above) arranged between the platform 5 (fig. 1) and tip B (fig. 1 above) sections; a trailing edge D (fig. 1 above) arranged downstream of the leading edge; and a main section E (fig. 1 above) arranged between the leading edge C (fig. 1 above), trailing edge D (fig. 1 above), platform 5 (fig. 1) section and tip B (fig. 1 above) sections, wherein a material of the component includes an isotropic distribution, directionally solidified, or a single-crystal grain structure (col. 3, line 40-44, "the component preferably has a directionally solidified grain structure").

Burgel does not explicitly disclose that *the superalloy is precipitation strengthened by the addition of 50 ppm to 500 ppm of a strength promoter selected from the group consisting of: zinc (Zn), tin (Sn), gallium (Ga), selenium (Se), and arsenic (As).*

However, Bicicchi teaches the turbine bucket (page 2, line 39, "form a turbine bucket") that made of a superalloy (page 2, line 25-36, the alloy of Bicicchi is considered to be superalloy since it can withstand high combustion temperature) is precipitation strengthened by the addition of 50 ppm to 500 ppm (page 2, line 33, "0.03 max" or 300 ppm, and page 2, line 40, an alloy as defined above and heat treating") of a strength promoter of tin (Sn) (page 2, line 33, "Tin").

Clark teaches a turbine rotor segment 3 (fig. 1) the made of a nickel base superalloy (col. 3, line 59-60, "3.25-3.75 percent Ni") that is precipitation strengthened by the addition of 50 ppm to 500 ppm (col. 3, line 63, "up to 0.015" or 150 ppm) of a strength promoter of tin (Sn) (col. 3, line 63, "up to 0.015 percent of Sn").

Note that Clark NiCrMoV is considered to meet claimed limitation "a nickel base superalloy", since the nickel base superalloy is defined as "an alloy whose main constituent is nickel" and since the nickel element has the highest percentage in the superalloy composition in Clark.

Bodnar teaches turbine rotor steel 10 (fig. 1) having the precipitation strengthened by the addition of 50 ppm to 500 ppm (col. 2, line 57, "less than about 0.010 percent tin" above 100 ppm and col. 1, line 65-66, "When the steel is given a conventional heat treatment") of a strength promoter tin (Sn) (col. 2, line 57).

Boyle teaches steel alloy that is used in the high temperature components (col. 1, line 8-11) having the precipitation strengthened by the addition of 50 ppm to 500 ppm (col. 2, line 4, "tin 0.04%", or 400 ppm) of a strength promoter tin (Sn) (col. 2, line 4).

Darolia teaches a nickel base superalloy (col. 4, line 45, "about 50 at. % to about 53 at. % Ni") is precipitation strengthened by the addition 100 ppm to 2500 ppm (col. 4, line 45-46, "about 0.01 at % to about 0.25 at. % gallium") having a strength promoter of gallium (Ga) (col. 4, line 45-46).

Tanaka teaches a nickel base superalloy (col. 2, line 53, "The hard facing nickel-base alloy described in either of the above (1), (2), (3) and (4) further contain 0.1 to 3% by weight of tin") is precipitation strengthened by additional of 1000 ppm to 30000 ppm

of tin (Sn) (col. 2, line 53, "The hard facing nickel-base alloy described in either of the above (1), (2), (3) and (4) further contain 0.1 to 3% by weight of tin" or 1000 ppm to 30000 ppm).

Also note that although Tanaka's range (0.1 to 3% or 1000 ppm to 30000 ppm) is above the applicant's range (0.005 to 0.05 % or 50 ppm to 500 ppm), however, it has been in *Titanium Metals Corp. of America v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985) (Court held as proper a rejection of a claim directed to an alloy of "having 0.8% nickel, 0.3% molybdenum, up to 0.1% iron, balance titanium" as obvious over a reference disclosing alloys of 0.75% nickel, 0.25% molybdenum, balance titanium and 0.94% nickel, 0.31% molybdenum, balance titanium.) that a prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties, see MPEP 2144.05. Further the applicant discloses on page 3, lines 29-33 of the specification that "the object relating to a component is achieved by the provision of a high-temperature-resistant component made from an alloy which contains at least one strength promoter in an amount of at most 2000 ppm, in particular 1100 ppm", therefore, the range of the strength promoter is not critical.

Therefore, it would have been obvious to one of ordinary skill in the art at the time invention was made to modify Burgel's invention to include *the nickel base superalloy is precipitation strengthened by the addition of 50 ppm to 500 ppm of a strength promoter selected from the group consisting of: zinc (Zn), tin (Sn), gallium (Ga), selenium (Se), and arsenic (As)*, as suggested and taught by, Bicicchi or Clark or

Bodnar or Boyle or Darolia or Tanaka, for the purpose of providing a suitable strength promoter material that provide an additional strength to the alloy of the turbine component (Bicicchi, page 2, line 39-42, "an alloy as defined above and heat treating the forged bucket to a yield strength level in excess of 1000,000 psi and impact absorption properties in excess of 60 ft-lbs") or (Clark, page 3, line 18-20, "A first rotor segment 13 is of a ferrous alloy that is a high temperature alloy that has sufficient creep and fatigue strength about 1000F. (538 C)") or (Boyle, col. 5, line 26-30, "the present materials have a much better reduction of area at higher tensile strength ranges. They also have a much higher rupture strength and better rupture ductility") or (Bodnar, col. 2, line 18-26, "It would be desirable to indentify a material of construction for stream and gas turbine rotors that retains the previously established and highly desirable characteristic and properties of the 1%CrMoV family of steels, but which has a reduced FATT, is more resistant to degradation in the for of decreasing mechanical properties and the appearance of temper brittlemment, has better hardenability") or Darolia (col. 2, line 66 to col. 3, line 4, "Another advantage of the alloy of the present invention is that it has a low density, about, about 0.210 lbs/in³ making it very suitable for use as an airfoil or as a turbine disk in a turbine engine due to the significant decrease in density over current alloys. Other advantages include excellent oxidation resistance") or Tanaka (col. 2, lines 11-17).

5. As to claims 21-22, Burgel discloses the superalloy comprises: (see table below).

	Claim 21	Claim 22	Burgel
Chromium	11-13 wt%	9-<11 wt%	11-13 wt%
Tungsten	3-5 wt%	3-5 wt%	3-5 wt%

Molybdenum	0.5-2.5 wt%	0.5-2.5 wt%	0.5-2.5 wt%
Aluminum	3-5 wt%	3-5 wt%	3-5 wt%
Titanium	3-5 wt%	3-5 wt%	3-5 wt%
Tantalum	3-7 wt%	3-7 wt%	3-7 wt%
Cobalt	0-12 wt%	0-12 wt%	0-12 wt%
Niobium	0-1 wt%	0-1 wt%	0-1 wt%
Hafnium	0-2 wt%	0-2 wt%	0-2 wt%
Zirconium	0-1 wt%	0-1 wt%	0-1 wt %
Boron	0-0.05 wt%	0-0.05 wt%	0-0.05 wt%
Carbon	0 -0.2 wt%	0 -0.2 wt%	0-0.2 wt%
Rhenium or Ruthenium	0.1-10 wt%	0.1-5 wt%	1-5 wt% (Re) 0-5 wt% (Ru)
Nickel or cobalt or iron and impurities	Remainder	Remainder	Remainder

In claim 21, Burgel discloses the elements (chromium, tungsten, molybdenum, aluminum, titanium, tantalum, cobalt, niobium, hafnium, zirconium, boron, carbon) that are the same percentage by weight as claimed and the elements (Ru or Re) is within the claimed range (0.1-10) with 10 percent by weight (Re and Ru of Burgel is 5 wt% each with 10 wt% max) maximum as claimed (Re or Ru is 10 wt% max), therefore, the remainder will be about the same percentage by weight.

Further, it would have been obvious to select any portion of the discloses ranges of (Re or Ru) that include the instant claimed ranges, in view of the fact that "A prior art reference that discloses a range encompassing a somewhat narrower claimed range is sufficient to establish a *prima facie* case of obviousness." In re Peterson, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382-83 (Fed. Cir. 2003). >See also In re Harris, 409 F.3d 1339, 74 USPQ2d 1951 (Fed. Cir. 2005)(claimed alloy held obvious over prior art

alloy that taught ranges of weight percentages overlapping, and in most instances completely encompassing, claimed ranges; furthermore, narrower ranges taught by reference overlapped all but one range in claimed invention)" [see MPEP 2144.05, I], as suggested and taught by Burgel, for the purpose of providing a suitable Re or Ru percentage range in the superalloy, thereby, optimizing the strength of the alloy.

In claim 22, Burgel discloses the elements (tungsten, molybdenum, aluminum, titanium, tantalum, cobalt, niobium, hafnium, zirconium, boron, carbon) that are the same percentage by weight as claimed, the elements (Re or Ru) is within the claimed range and percentage by weight of chromium is very closed to the claimed range.

Therefore, it would have been obvious for one of ordinary skill in the art at the time invention was made to have the portion of chromium and (Re and Ru) to be within the claimed range, sine it had been held that "a prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties." [MPEP 2144.05, I] *Titanium Metals Corp. of America v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985) (Court held as proper a rejection of a claim directed to an alloy of "having 0.8% nickel, 0.3% molybdenum, up to 0.1% iron, balance titanium" as obvious over a reference disclosing alloys of 0.75% nickel, 0.25% molybdenum, balance titanium and 0.94% nickel, 0.31% molybdenum, balance titanium.)" and "A prior art reference that discloses a range encompassing a somewhat narrower claimed range is sufficient to establish a prima facie case of obviousness." In re Peterson, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382-83 (Fed. Cir. 2003). >See also In re Harris, 409

F.3d 1339, 74 USPQ2d 1951 (Fed. Cir. 2005)(claimed alloy held obvious over prior art alloy that taught ranges of weight percentages overlapping, and in most instances completely encompassing, claimed ranges; furthermore, narrower ranges taught by reference overlapped all but one range in claimed invention)" [see MPEP 2144.05, I], as suggested and taught by Burgel, for the purpose of providing a suitable chromium and (Re and Ru) percentage range in the superalloy, thereby, optimizing the strength of the alloy.

Further, in view of the fact that "The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages." In re Peterson, 315 F.3d at 1330, 65 USPQ2d at 1382 [MPEP 2144.05, II].

6. As to claims 23, 26 and 40, Burgel discloses a high temperature gas turbine component the made from a precipitant containing alloy (col. 2, line 21, "a nickel-base superalloy" and col. 4, line 55-56, "a melt 101 of metal"), wherein the component consists of a nickel-based superalloy (col. 4, line 46-47, "The gas turbine blade is produced from a nickel-base superalloy") and wherein a material of the component includes an isotropic distribution, directionally solidified (col. 3, line 40-41, "the component preferably has a directionally solidified") or single-crystal grain structure.

Burgel does not explicitly disclose that *the metallic strength promoter is in an amount of 50 ppm to 500 ppm that increases the strength of the component by*

increasing the formation of precipitants where the strength promoter is selected from the group consisting of: zinc (Zn), tin (Sn), gallium (Ga), selenium (Se), and arsenic (As) and wherein the alloy contains between 100 to 500 ppm of the strength promoter (claim 26) and where the strength promoter is selected from tin (Sn) (claim 40).

However, Bicicchi teaches the turbine bucket (page 2, line 39, "form a turbine bucket") that made of a superalloy (page 2, line 25-36, the alloy of Bicicchi is considered to be superalloy since it can withstand high combustion temperature) is precipitation strengthened by the addition of 50 ppm to 500 ppm (page 2, line 33, "0.03 max" or 300 ppm, and page 2, line 40, an alloy as defined above and heat treating") of a strength promoter of tin (Sn) (page 2, line 33, "Tin").

Clark teaches a turbine rotor segment 3 (fig. 1) the made of a nickel base superalloy (col. 3, line 59-60, "3.25-3.75 percent Ni") that is precipitation strengthened by the addition of 50 ppm to 500 ppm (col. 3, line 63, "up to 0.015" or 150 ppm) of a strength promoter of tin (Sn) (col. 3, line 63, "up to 0.015 percent of Sn").

Note that Clark NiCrMoV is considered to meet claimed limitation "a nickel base superalloy", since the nickel base superalloy is defined as "an alloy whose main constituent is nickel" and since the nickel element has the highest percentage in the superalloy composition in Clark.

Bodnar teaches turbine rotor steel 10 (fig. 1) having the precipitation strengthened by the addition of 50 ppm to 500 ppm (col. 2, line 57, "less than about 0.010 percent tin" above 100 ppm and col. 1, line 65-66, "When the steel is given a conventional heat treatment") of a strength promoter tin (Sn) (col. 2, line 57).

Boyle teaches steel alloy that is used in the high temperature components (col. 1, line 8-11) having the precipitation strengthened by the addition of 50 ppm to 500 ppm (col. 2, line 4, "tin 0.04%", or 400 ppm) of a strength promoter tin (Sn) (col. 2, line 4).

Darolia teaches a nickel base superalloy (col. 4, line 45, "about 50 at. % to about 53 at. % Ni") is precipitation strengthened by the addition 100 ppm to 2500 ppm (col. 4, line 45-46, "about 0.01 at % to about 0.25 at. % gallium") having a strength promoter of gallium (Ga) (col. 4, line 45-46).

Tanaka teaches a nickel base superalloy (col. 2, line 53, "The hard facing nickel-base alloy described in either of the above (1), (2), (3) and (4) further contain 0.1 to 3% by weight of tin") is precipitation strengthened by additional of 1000 ppm to 30000 ppm of tin (Sn) (col. 2, line 53, "The hard facing nickel-base alloy described in either of the above (1), (2), (3) and (4) further contain 0.1 to 3% by weight of tin" or 1000 ppm to 30000 ppm).

Also note that although Tanaka's range (0.1 to 3% or 1000 ppm to 30000 ppm) is above the applicant's range (0.005 to 0.05 % or 50 ppm to 500 ppm), however, it has been in *Titanium Metals Corp. of America v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985) (Court held as proper a rejection of a claim directed to an alloy of "having 0.8% nickel, 0.3% molybdenum, up to 0.1% iron, balance titanium" as obvious over a reference disclosing alloys of 0.75% nickel, 0.25% molybdenum, balance titanium and 0.94% nickel, 0.31% molybdenum, balance titanium.) that a prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to

have the same properties, see MPEP 2144.05. Further the applicant discloses on page 3, lines 29-33 of the specification that "the object relating to a component is achieved by the provision of a high-temperature-resistant component made from an alloy which contains at least one strength promoter in an amount of at most 2000 ppm, in particular 1100 ppm", therefore, the range of the strength promoter is not critical.

Therefore, it would have been obvious to one of ordinary skill in the art at the time invention was made to modify Burgel's invention to include *the nickel base superalloy is precipitation strengthened by the addition of 50 ppm to 500 ppm of a strength promoter selected from the group consisting of: zinc (Zn), tin (Sn), gallium (Ga), selenium (Se), and arsenic (As)*, as suggested and taught by, Bicicchi or Clark or Bodnar or Boyle or Darolia or Tanaka, for the purpose of providing a suitable strength promoter material that provide an additional strength to the alloy of the turbine component (Bicicchi, page 2, line 39-42, "an alloy as defined above and heat treating the forged bucket to a yield strength level in excess of 1000,000 psi and impact absorption properties in excess of 60 ft-lbs") or (Clark, page 3, line 18-20, "A first rotor segment 13 is of a ferrous alloy that is a high temperature alloy that has sufficient creep and fatigue strength about 1000F. (538 C)") or (Boyle, col. 5, line 26-30, "the present materials have a much better reduction of area at higher tensile strength ranges. They also have a much higher rupture strength and better rupture ductility") or (Bodnar, col. 2, line 18-26, "It would be desirable to indentify a material of construction for stream and gas turbine rotors that retains the previously established and highly desirable characteristic and properties of the 1%CrMoV family of steels, but which has a reduced

FATT, is more resistant to degradation in the for of decreasing mechanical properties and the appearance of temper brittlemnt, has better hardenability") or Darolia (col. 2, line 66 to col. 3, line 4, "Another advantage of the alloy of the present invention is that it has a low density, about, about 0.210 lbs/in³ making it very suitable for use as an airfoil or as a turbine disk in a turbine engine due to the significant decrease in density over current alloys. Other advantages include excellent oxidation resistance") or Tanaka (col. 2, lines 11-17).

7. As to claims 27-28, Burgel discloses the superalloy comprises: (see table below).

	Claim 27	Claim 28	Burgel
Chromium	11-13 wt%	9-<11 wt%	11-13 wt%
Tungsten	3-5 wt%	3-5 wt%	3-5 wt%
Molybdenum	0.5-2.5 wt%	0.5-2.5 wt%	0.5-2.5 wt%
Aluminum	3-5 wt%	3-5 wt%	3-5 wt%
Titanium	3-5 wt%	3-5 wt%	3-5 wt%
Tantalum	3-7 wt%	3-7 wt%	3-7 wt%
Cobalt	0-12 wt%	0-12 wt%	0-12 wt%
Niobium	0-1 wt%	0-1 wt%	0-1 wt%
Hafnium	0-2 wt%	0-2 wt%	0-2 wt%
Zirconium	0-1 wt%	0-1 wt%	0-1 wt %
Boron	0-0.05 wt%	0-0.05 wt%	0-0.05 wt%
Carbon	0 -0.2 wt%	0 -0.2 wt%	0-0.2 wt%
Rhenium or Ruthenium	0.1-10 wt%	0.1-5 wt%	1-5 wt% (Re) 0-5 wt% (Ru)
Nickel or cobalt or iron and impurities	Remainder	Remainder	Remainder

In claim 27, Burgel discloses the elements (chromium, tungsten, molybdenum, aluminum, titanium, tantalum, cobalt, niobium, hafnium, zirconium, boron, carbon) that

are the same percentage by weight as claimed and the elements (Ru or Re) is within the claimed range (0.1-10) with 10 percent by weight (Re and Ru of Burgel is 5 wt% each with 10 wt% max) maximum as claimed (Re or Ru is 10 wt% max), therefore, the remainder will be about the same percentage by weight.

Further, it would have been obvious to select any portion of the discloses ranges of (Re or Ru) that include the instant claimed ranges, in view of the fact that "A prior art reference that discloses a range encompassing a somewhat narrower claimed range is sufficient to establish a *prima facie* case of obviousness." In re Peterson, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382-83 (Fed. Cir. 2003). >See also In re Harris, 409 F.3d 1339, 74 USPQ2d 1951 (Fed. Cir. 2005)(claimed alloy held obvious over prior art alloy that taught ranges of weight percentages overlapping, and in most instances completely encompassing, claimed ranges; furthermore, narrower ranges taught by reference overlapped all but one range in claimed invention)" [see MPEP 2144.05, I], as suggested and taught by Burgel, for the purpose of providing a suitable Re or Ru percentage range in the superalloy, thereby, optimizing the strength of the alloy.

In claim 28, Burgel discloses the elements of (tungsten, molybdenum, aluminum, titanium, tantalum, cobalt, niobium, hafnium, zirconium, boron, carbon) that are the same percentage by weight as claimed, the elements (Re or Ru) is within the claimed range and percentage by weight of chromium is very closed to the claimed range.

Therefore, it would have been obvious for one of ordinary skill in the art at the time invention was made to have the portion of chromium and (Re and Ru) to be within the claimed range, sine it had been held that "a *prima facie* case of obviousness exists

where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties." [MPEP 2144.05, I] *Titanium Metals Corp. of America v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985) (Court held as proper a rejection of a claim directed to an alloy of "having 0.8% nickel, 0.3% molybdenum, up to 0.1% iron, balance titanium" as obvious over a reference disclosing alloys of 0.75% nickel, 0.25% molybdenum, balance titanium and 0.94% nickel, 0.31% molybdenum, balance titanium.)" and "A prior art reference that discloses a range encompassing a somewhat narrower claimed range is sufficient to establish a *prima facie* case of obviousness." *In re Peterson*, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382-83 (Fed. Cir. 2003). >See also *In re Harris*, 409 F.3d 1339, 74 USPQ2d 1951 (Fed. Cir. 2005)(claimed alloy held obvious over prior art alloy that taught ranges of weight percentages overlapping, and in most instances completely encompassing, claimed ranges; furthermore, narrower ranges taught by reference overlapped all but one range in claimed invention)" [see MPEP 2144.05, I], as suggested and taught by Burgel, for the purpose of providing a suitable chromium and (Re and Ru) percentage range in the superalloy, thereby, optimizing the strength of the alloy.

Further, in view of the fact that "The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages." *In re Peterson*, 315 F.3d at 1330, 65 USPQ2d at 1382 [MPEP 2144.05, II].

8. As to claims 29-33, discloses the superalloy contains: (see table below).

	Claim 29	Claim 30	Claim 31	Claim 32	Claim 33	Burgel
Aluminum	3-<3.5 wt%					3-5 wt%
Rhenium		1.3-10 wt%	1.3-5 wt%			1-5 wt%
Ruthenium				1.3-3 wt%	0.5-5 wt%	0-5 wt%

In claims 29-33, the superalloy compositions discloses by Burgel overlaps the applicant's claimed superalloy compositions.

Therefore, it would have been obvious to one of ordinary skill in the art at the time invention was made to select any portion of the discloses ranges of (Al, Re and Ru) that include the instant claimed ranges from the ranges discloses in the prior art reference, particularly in view of the fact that "In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990) (The prior art taught carbon monoxide concentrations of "about 1-5%" while the claim was limited to "more than 5%." The court held that "about 1-5%" allowed for concentrations slightly above 5% thus the ranges overlapped.); In re Geisler, 116 F.3d 1465, 1469-71, 43 USPQ2d 1362, 1365-66 (Fed. Cir. 1997) (Claim reciting thickness of a protective layer as falling within a range of "50 to 100 Angstroms" considered prima facie obvious in view of prior art reference teaching that "for suitable protection, the thickness of the protective layer should be not less than about 10 nm [i.e., 100 Angstroms]." The court stated that "by stating that suitable protection' is provided if the protective layer is about' 100

Angstroms thick, [the prior art reference] directly teaches the use of a thickness within [applicant's] claimed range.") [MPEP 2144.05, I], as suggested and taught by, Burgel, for the purpose of providing a suitable aluminum, rhenium and ruthenium percentage ranges in the superalloy, thereby, optimizing the strength of the alloy.

Further, in view of the fact that "The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages." In re Peterson, 315 F.3d at 1330, 65 USPQ2d at 1382 [MPEP 2144.05, II].

9. As to claim 39, Burgel discloses a nickel base superalloy (col. 4, line 46-47, "The gas turbine blade 1 is produced from a nickel-base superalloy") of a high temperature gas turbine component the made from a superalloy (col. 2, line 21, "a nickel-base superalloy"), the component comprising: a root section A (fig. 1 above); a platform section 5 (fig. 1) arranged adjacent to the root section A (fig. 1 above); a tip section B (fig. 1 above) arranged radially opposite the root section A (fig. 1 above); a leading edge C (fig. 1 above) arranged between the platform 5 (fig. 1) and tip B (fig. 1 above) sections; a trailing edge D (fig. 1 above) arranged downstream of the leading edge; and a main section E (fig. 1 above) arranged between the leading edge C (fig. 1 above), trailing edge D (fig. 1 above), platform 5 (fig. 1) section and tip B (fig. 1 above) sections wherein a material of the gas turbine component includes an isotropic distribution, directionally solidified (col. 3, line 40-41, "the component preferably has a directionally solidified grain structure") or a single-crystal grain structure.

Burgel does not explicitly disclose that *the superalloy is precipitation strengthened by the addition of 100 ppm to 500 ppm of a strength promoter is selected from tin (Sn)*.

However, Bicicchi teaches the turbine bucket (page 2, line 39, "form a turbine bucket") that made of a superalloy (page 2, line 25-36, the alloy of Bicicchi is considered to be superalloy since it can withstand high combustion temperature) is precipitation strengthened by the addition of 50 ppm to 500 ppm (page 2, line 33, "0.03 max" or 300 ppm, and page 2, line 40, an alloy as defined above and heat treating") of a strength promoter of tin (Sn) (page 2, line 33, "Tin").

Clark teaches a turbine rotor segment 3 (fig. 1) the made of a nickel base superalloy (col. 3, line 59-60, "3.25-3.75 percent Ni") that is precipitation strengthened by the addition of 50 ppm to 500 ppm (col. 3, line 63, "up to 0.015" or 150 ppm) of a strength promoter of tin (Sn) (col. 3, line 63, "up to 0.015 percent of Sn").

Note that Clark NiCrMoV is considered to meet claimed limitation "a nickel base superalloy", since the nickel base superalloy is defined as "an alloy whose main constituent is nickel" and since the nickel element has the highest percentage in the superalloy composition in Clark.

Bodnar teaches turbine rotor steel 10 (fig. 1) having the precipitation strengthened by the addition of 50 ppm to 500 ppm (col. 2, line 57, "less than about 0.010 percent tin" above 100 ppm and col. 1, line 65-66, "When the steel is given a conventional heat treatment") of a strength promoter tin (Sn) (col. 2, line 57).

Boyle teaches steel alloy that is used in the high temperature components (col. 1, line 8-11) having the precipitation strengthened by the addition of 50 ppm to 500 ppm (col. 2, line 4, "tin 0.04%", or 400 ppm) of a strength promoter tin (Sn) (col. 2, line 4).

Darolia teaches a nickel base superalloy (col. 4, line 45, "about 50 at. % to about 53 at. % Ni") is precipitation strengthened by the addition 100 ppm to 2500 ppm (col. 4, line 45-46, "about 0.01 at % to about 0.25 at. % gallium") having a strength promoter of gallium (Ga) (col. 4, line 45-46).

Tanaka teaches a nickel base superalloy (col. 2, line 53, "The hard facing nickel-base alloy described in either of the above (1), (2), (3) and (4) further contain 0.1 to 3% by weight of tin") is precipitation strengthened by additional of 1000 ppm to 30000 ppm of tin (Sn) (col. 2, line 53, "The hard facing nickel-base alloy described in either of the above (1), (2), (3) and (4) further contain 0.1 to 3% by weight of tin" or 1000 ppm to 30000 ppm).

Also note that although Tanaka's range (0.1 to 3% or 1000 ppm to 30000 ppm) is above the applicant's range (0.005 to 0.05 % or 50 ppm to 500 ppm), however, it has been in *Titanium Metals Corp. of America v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985) (Court held as proper a rejection of a claim directed to an alloy of "having 0.8% nickel, 0.3% molybdenum, up to 0.1% iron, balance titanium" as obvious over a reference disclosing alloys of 0.75% nickel, 0.25% molybdenum, balance titanium and 0.94% nickel, 0.31% molybdenum, balance titanium.) that a prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to

have the same properties, see MPEP 2144.05. Further the applicant discloses on page 3, lines 29-33 of the specification that "the object relating to a component is achieved by the provision of a high-temperature-resistant component made from an alloy which contains at least one strength promoter in an amount of at most 2000 ppm, in particular 1100 ppm", therefore, the range of the strength promoter is not critical.

Therefore, it would have been obvious to one of ordinary skill in the art at the time invention was made to modify Burgel's invention to include *the nickel base superalloy is precipitation strengthened by the addition of 50 ppm to 500 ppm of a strength promoter selected from the group consisting of: zinc (Zn), tin (Sn), gallium (Ga), selenium (Se), and arsenic (As)*, as suggested and taught by, Bicicchi or Clark or Bodnar or Boyle or Darolia or Tanaka, for the purpose of providing a suitable strength promoter material that provide an additional strength to the alloy of the turbine component (Bicicchi, page 2, line 39-42, "an alloy as defined above and heat treating the forged bucket to a yield strength level in excess of 1000,000 psi and impact absorption properties in excess of 60 ft-lbs") or (Clark, page 3, line 18-20, "A first rotor segment 13 is of a ferrous alloy that is a high temperature alloy that has sufficient creep and fatigue strength about 1000F. (538 C)") or (Boyle, col. 5, line 26-30, "the present materials have a much better reduction of area at higher tensile strength ranges. They also have a much higher rupture strength and better rupture ductility") or (Bodnar, col. 2, line 18-26, "It would be desirable to indentify a material of construction for stream and gas turbine rotors that retains the previously established and highly desirable characteristic and properties of the 1%CrMoV family of steels, but which has a reduced

FATT, is more resistant to degradation in the for of decreasing mechanical properties and the appearance of temper brittleness, has better hardenability") or Darolia (col. 2, line 66 to col. 3, line 4, "Another advantage of the alloy of the present invention is that it has a low density, about, about 0.210 lbs/in³ making it very suitable for use as an airfoil or as a turbine disk in a turbine engine due to the significant decrease in density over current alloys. Other advantages include excellent oxidation resistance") or Tanaka (col. 2, lines 11-17).

10. Claim 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over Burgel in view of Bicicchi or Clark or Bodnar or Boyle or Darolia or Tanaka and Yoshinari (US Patent No. 5,611,670).

11. As to claim 36, Burgel discloses the essential of the claimed invention except *the precipitation is the gamma phase*.

However, Yoshinari teaches a nickel base superalloy (col. 8, line 17-18, "the Ni-base superalloy which constitutes the blades for the gas turbine") for the gas turbine blade that undergo a heat treatment of dissolving precipitated γ' -phases into gamma phase of the base (col. 7, line 30-35).

Therefore, it would have been obvious to one of ordinary skill in the art at the time invention was made to modify Burgel's invention such that *the precipitation is the gamma phase* (it would have been obvious for the nickel alloy blade of Burgel to undergo gamma phase as described by Yoshinari), as suggested and taught by Yoshinari, for the purpose of providing the turbine blade with a high creep strength (col. 7, line 32-33).

12. Claims 38 and 41-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Burgel in view of Bicicchi or Clark or Bodnar or Boyle or Darolia or Tanaka and Taylor (US Patent No. 3,631,674).

13. As to claims 38 and 41-42, Burgel discloses a gas turbine component (col. 4, line 41, "a gas turbine blade") the made from a superalloy (col. 2, line 21, "a nickel-base superalloy"), the component comprising: a root section A (fig. 1 above); a platform section 5 (fig. 1) arranged adjacent to the root section A (fig. 1 above); a tip section B (fig. 1 above) arranged radially opposite the root section A (fig. 1 above); a leading edge C (fig. 1 above) arranged between the platform 5 (fig. 1) and tip B (fig. 1 above) sections; a trailing edge D (fig. 1 above) arranged downstream of the leading edge; and a main section E (fig. 1 above) arranged between the leading edge C (fig. 1 above), trailing edge D (fig. 1 above), platform 5 (fig. 1) section and tip B (fig. 1 above) sections and wherein a material of the combustion chamber or the turbine component includes an isotropic distribution, directionally solidified (col. 3, line 41, "In a directional solidified structure"), or single-crystal grain structure.

Burgel does not explicitly disclose that *a gas turbine engine, comprising: a rotationally mounted rotor arranged coaxially with the longitudinal axis of the engine; an intake housing arranged coaxially with the rotor that intakes a working fluid; a compressor that compresses the working fluid; an annular combustion chamber comprised of a plurality of components that accepts the compressed working fluid, mixes a fuel with the compressed working fluid and combusts the compressed working*

fluid and fuel mixture to create a hot working fluid; and a turbine section that expands the hot working fluid, the superalloy is precipitation strengthened by the addition of 100 ppm to 500 ppm (claim 38 and 42) of a strength promoter is selected from tin (Sn) (claim 41).

However, Taylor teaches a gas turbine engine 10 (fig. 1), comprising: a rotationally mounted rotor 18 (fig. 1) arranged coaxially with the longitudinal axis (fig. 1, the central axis of the engine) of the engine; an intake housing 12 (fig. 1) arranged coaxially with the rotor that intakes a working fluid (fig. 1); a compressor 18 (fig. 1) that compresses the working fluid; an annular combustion chamber 27 (fig. 1) comprised of a plurality of components 46, 38, 40 (fig. 2) that accepts the compressed working fluid (fig. 2), mixes a fuel with the compressed working fluid and combusts the compressed working fluid and fuel mixture to create a hot working fluid (col. 4, line 28-36); and a turbine section 28 (fig. 1) that expands the hot working fluid.

Bicicchi teaches the turbine bucket (page 2, line 39, "form a turbine bucket") that made of a superalloy (page 2, line 25-36, the alloy of Bicicchi is considered to be superalloy since it can withstand high combustion temperature) is precipitation strengthened by the addition of 50 ppm to 500 ppm (page 2, line 33, "0.03 max" or 300 ppm, and page 2, line 40, an alloy as defined above and heat treating") of a strength promoter of tin (Sn) (page 2, line 33, "Tin").

Clark teaches a turbine rotor segment 3 (fig. 1) the made of a nickel base superalloy (col. 3, line 59-60, "3.25-3.75 percent Ni") that is precipitation strengthened

by the addition of 50 ppm to 500 ppm (col. 3, line 63, "up to 0.015" or 150 ppm) of a strength promoter of tin (Sn) (col. 3, line 63, "up to 0.015 percent of Sn").

Note that Clark NiCrMoV is considered to meet claimed limitation "a nickel base superalloy", since the nickel base superalloy is defined as "an alloy whose main constituent is nickel" and since the nickel element has the highest percentage in the superalloy composition in Clark.

Bodnar teaches turbine rotor steel 10 (fig. 1) having the precipitation strengthened by the addition of 50 ppm to 500 ppm (col. 2, line 57, "less than about 0.010 percent tin" above 100 ppm and col. 1, line 65-66, "When the steel is given a conventional heat treatment") of a strength promoter tin (Sn) (col. 2, line 57).

Boyle teaches steel alloy that is used in the high temperature components (col. 1, line 8-11) having the precipitation strengthened by the addition of 50 ppm to 500 ppm (col. 2, line 4, "tin 0.04%", or 400 ppm) of a strength promoter tin (Sn) (col. 2, line 4).

Darolia teaches a nickel base superalloy (col. 4, line 45, "about 50 at. % to about 53 at. % Ni") is precipitation strengthened by the addition 100 ppm to 2500 ppm (col. 4, line 45-46, "about 0.01 at % to about 0.25 at. % gallium") having a strength promoter of gallium (Ga) (col. 4, line 45-46).

Tanaka teaches a nickel base superalloy (col. 2, line 53, "The hard facing nickel-base alloy described in either of the above (1), (2), (3) and (4) further contain 0.1 to 3% by weight of tin") is precipitation strengthened by additional of 1000 ppm to 30000 ppm of tin (Sn) (col. 2, line 53, "The hard facing nickel-base alloy described in either of the

above (1), (2), (3) and (4) further contain 0.1 to 3% by weight of tin" or 1000 ppm to 30000 ppm).

Also note that although Tanaka's range (0.1 to 3% or 1000 ppm to 30000 ppm) is above the applicant's range (0.005 to 0.05 % or 50 ppm to 500 ppm), however, it has been in *Titanium Metals Corp. of America v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985) (Court held as proper a rejection of a claim directed to an alloy of "having 0.8% nickel, 0.3% molybdenum, up to 0.1% iron, balance titanium" as obvious over a reference disclosing alloys of 0.75% nickel, 0.25% molybdenum, balance titanium and 0.94% nickel, 0.31% molybdenum, balance titanium.) that a prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties, see MPEP 2144.05. Further the applicant discloses on page 3, lines 29-33 of the specification that "the object relating to a component is achieved by the provision of a high-temperature-resistant component made from an alloy which contains at least one strength promoter in an amount of at most 2000 ppm, in particular 1100 ppm", therefore, the range of the strength promoter is not critical.

Therefore, it would have been obvious to one of ordinary skill in the art at the time invention was made to modify Burgel's invention to include *the nickel base superalloy is precipitation strengthened by the addition of 50 ppm to 500 ppm of a strength promoter selected from the group consisting of: zinc (Zn), tin (Sn), gallium (Ga), selenium (Se), and arsenic (As)*, as suggested and taught by, Bicicchi or Clark or Bodnar or Boyle or Darolia or Tanaka, for the purpose of providing a suitable strength

promoter material that provide an additional strength to the alloy of the turbine component (Bicicchi, page 2, line 39-42, "an alloy as defined above and heat treating the forged bucket to a yield strength level in excess of 1000,000 psi and impact absorption properties in excess of 60 ft-lbs") or (Clark, page 3, line 18-20, "A first rotor segment 13 is of a ferrous alloy that is a high temperature alloy that has sufficient creep and fatigue strength about 1000F. (538 C)") or (Boyle, col. 5, line 26-30, "the present materials have a much better reduction of area at higher tensile strength ranges. They also have a much higher rupture strength and better rupture ductility") or (Bodnar, col. 2, line 18-26, "It would be desirable to indentify a material of construction for stream and gas turbine rotors that retains the previously established and highly desirable characteristic and properties of the 1%CrMoV family of steels, but which has a reduced FATT, is more resistant to degradation in the for of decreasing mechanical properties and the appearance of temper brittlemment, has better hardenability") or Darolia (col. 2, line 66 to col. 3, line 4, "Another advantage of the alloy of the present invention is that it has a low density, about, about 0.210 lbs/in³ making it very suitable for use as an airfoil or as a turbine disk in a turbine engine due to the significant decrease in density over current alloys. Other advantages include excellent oxidation resistance") or Tanaka (col. 2, lines 11-17).

Response to Arguments

14. Applicant's arguments with respect to claims 23-24, 26 and 40 as being anticipated by Bicicchi on page 2-3 of the remarks and claims 19, 38-39 and 41-42 as

being unpatentable over Bicicchi in view of Patterson on page 3 of the remarks have been considered but are moot in view of the new ground(s) of rejection.

15. In response to the argument with respect to claims 19, 21-24, 39-40 as being unpatentable over Burgel in view of Bicicchi or Clark or Bodnar or Boyle on page 4 of the remarks and claims 38 and 41-42 as being unpatentable over Burgel in view of Bicicchi or Clark or Bodnar or Boyle and Taylor on page 4 of the remarks that "As stated above in Response to rejections under the U.S.C. 102 section, Bicicchi will not remedy this deficiency as Bicicchi's turbine bucket includes steel and Applicant's component does not include steel.....Because Bicicchi, Clark, Bodnar, and Boyle all include steel as the alloy used, it is respectfully submitted that they all fail to remedy the deficiencies of Burgel noted above". The examiner respectfully disagree because Burgel discloses a nickel based superalloy (col. 4, line 46-47) but does not disclose the strength promoter of tin (Sn) in the amount of 50 ppm to 100 ppm (0.005 to 0.05 % by weight), however Bicicchi, Clark, Bodnar, and Boyle all teaches adding a strength promoter of tin (Sn) within the applicant's claimed range in their superalloy, see Clark, page 3, line 18-20, "A first rotor segment 13 is of a ferrous alloy that is a high temperature alloy that has sufficient creep and fatigue strength about 1000F. (538 C)" or Boyle, col. 5, line 26-30, "the present materials have a much better reduction of area at higher tensile strength ranges. They also have a much higher rupture strength and better rupture ductility" or Bodnar, col. 2, line 18-26, "It would be desirable to indentify a material of construction for stream and gas turbine rotors that retains the previously established and highly desirable characteristic and properties of the 1%CrMoV family of steels, but which has a

reduced FATT, is more resistant to degradation in the for of decreasing mechanical properties and the appearance of temper brittleness, has better hardenability" in order to increase the strength of the superalloy, therefore, the combinations of Burgel in view of Bicicchi or Clark or Bodnar or Boyle teach all of the limitations claimed. Further, the claims never recite that the element steel to be excluded from the reference.

Conclusion

16. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to PHUTTHIWAT WONGWIAN whose telephone number

is (571)270-5426. The examiner can normally be reached on Monday - Thursday,
7:30am - 5:00pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, EHUD GARTENBERG can be reached on 571-272-4828. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/P. W./
Examiner, Art Unit 3741

/William H Rodriguez/
Primary Examiner, Art Unit 3741